REVERSION HISTORY:

Date	Revision	Changes	
2022.01.11	A0	Initial released for preliminary datasheet	RENEE.CHEN
2022.01.27	A1	1. Add NOTE2 2. PACKING : 280 Pcs / Box CARTON 90 Pcs / Box	RENEE.CHEN
2022/9/6	A1	Add Preliminary specification without version updated	Vivian
2023.10.31	A2	Change the feature description 1. Low inductance < 3nH 2.Low thermal EMF (< 0.6μV/℃)	Renee.Chen

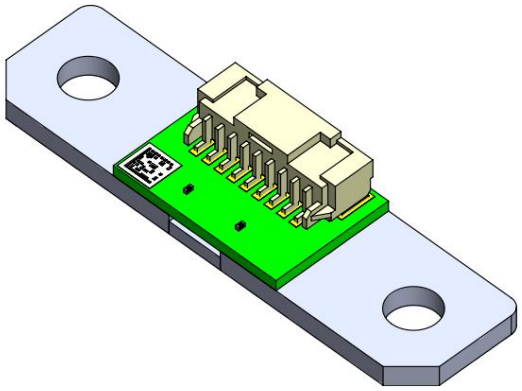
Shunt Module

500A, Shunt current module

VGE00-500VN-070E

FEATURES:

- Nominal Current Up to 500A
- High pulse current rating
- Low inductance (< 3nH)
- Low thermal EMF (< 0.6μV/℃)
- Welding construction; Excellent long-term stability
- Pb-free for RoHS compliant
- Ni & Sn plating assists with PCB mounting and corrosion protection



APPLICATIONS:

- EV/HEV BMS
- Battery and storage based application

GENERAL DESCRIPTION:

The shunt module is a PCBA which include two thermistors and a connector mount on the shunt resistor. User can easy mount the module on current sense location and connect to signal processing side via board to wire connection.

ELECTRICAL SPECIFICATIONS:

Characteristics	Feature
Nominal current	500A
Resistance value	100μΩ
Temperature coefficient of resistance(25℃/125℃)	± 100 ppm/℃
Storage and Operating Temperature*NOTE1	-40~125℃
Resistance tolerance	± 5%

*Note1: Operating temperature means that NTC temperature need to be between -40℃ to 125℃.

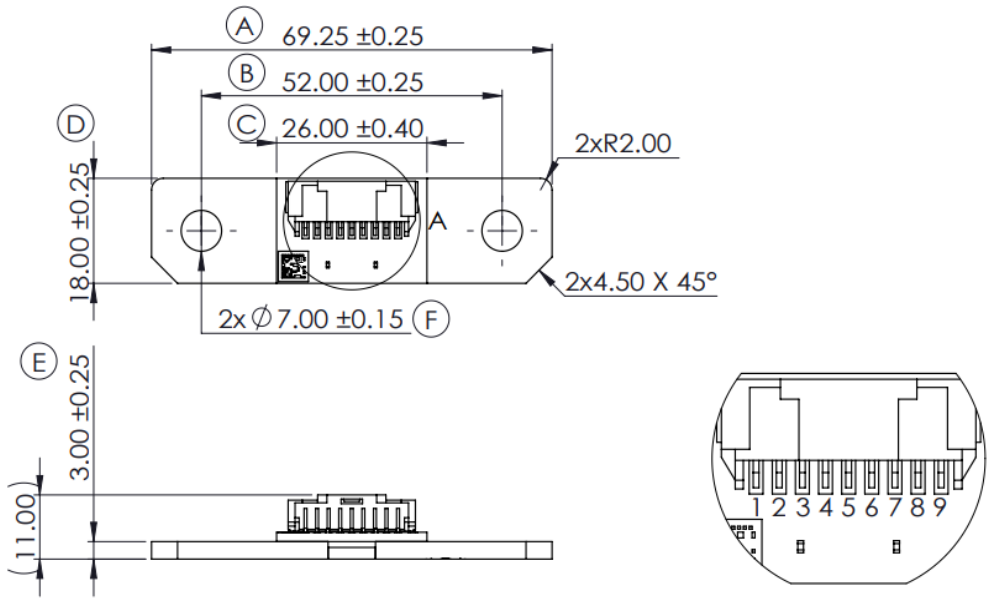
*Note2 : Pin8 and PIN9 are redundancy only.

DOCUMENT : CYNPW-221-006
(Preliminary specification)
REVISION : A2

OUTLINE DRAWING:

Unit: mm

Dimension



	Manufacture	Part No	Pin Definition
Connector	MOLEX	502352-0900	1: TEMP_NTC1_P
			2: TEMP_NTC1_N
			3: SHUNT_2_P
			4: SHUNT_1_P
			5: SHUNT_1_N
			6: SHUNT_2_N
			7: SHUNT_GND
			8: TEMP_NTC2_P
			9: TEMP_NTC2_N
Thermistor	Thinking	TSM0C103F34D1R	

*Connector Mates Part(s): 560123-0900, 505151-0901

Type Designation :

VGE 00 - 500 VN - 070E

(1) (2) (3) (4) (5)

Note :

(1) Series No.

(2) Connector type

(3) Nominal Current

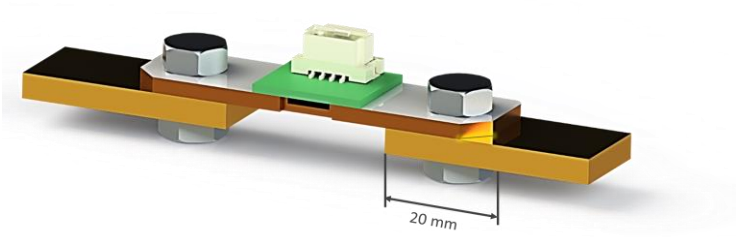
(4) Series No.

(5) Hardware Format

BUS BAR CONNECTION:

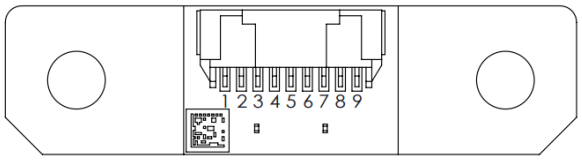
There are a few recommendations for a good connection.

- Always use screws with an outer diameter of 6 mm (M6)
- The recommended torque is 8~10Nm
- Shunt and bus bar must be clean.
- Correct mounting 20mm overlap ad shown in below figure.



Data-matrix Information for reference:

1. PCB Top overlay (for laser marking) dimension : 5mm x 5mm (ref.)
2. Data-matrix dimension : 4mm x 4mm (ref.)



3. Data-matrix information for reference

	Year	Month	Day	Module ID	Resistance R_{25}*	Quadratic coefficient	First-order coefficient	Constant term
Form	YYYY	MM	DD	XXXXX	Rxxxxxn or Rxxxxxxn*NOTE2	±x.xxxxxxxxx	±x.xxxxxxxxx	±x.xxxxxxxxx
Example	2021	11	25	00001	R100123n R99123n	-0.000000576	+0.000086780	+0.998188760
	If R≧100nOhm 2021112500001R100123n-0.000000576+0.000086780+0.998188760*NOTE3 If R<100nOhm 2021112500001R99123n-0.000000576+0.000086780+0.998188760*NOTE3							

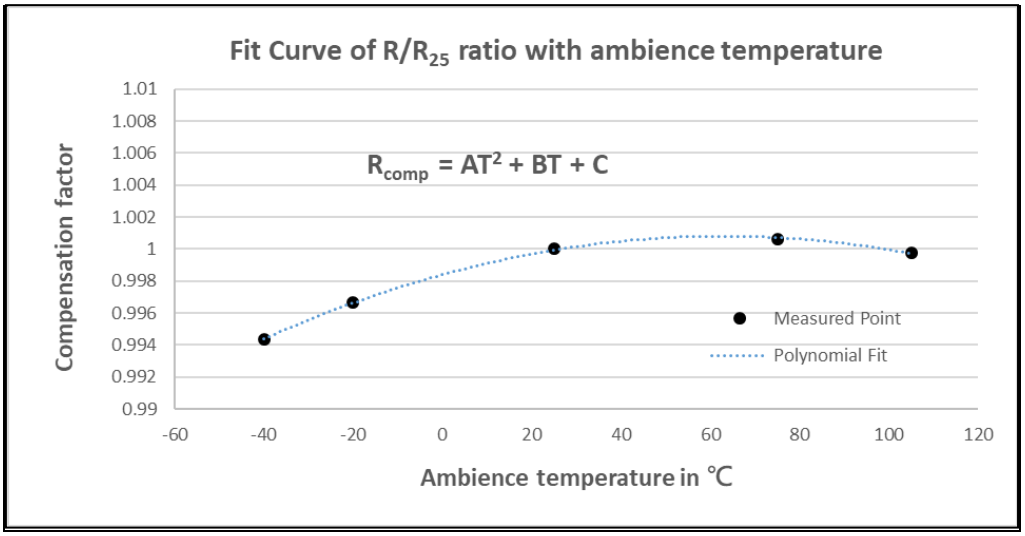
* R_{25} is shunt resistance at 25℃, unit: nOhm

* Note2 : If R≧100nOhm, content of resistance is Rxxxxxxn.

If R<100nOhm, content of resistance is Rxxxxxn.

*Note3 : If R≧100nOhm,total Characters is 57. And if R<100nOhm,total Characters is 56.

Shunt Temperature Compensation Function:



Generic compensation factor the resistance of shunt need to be multiplied with:

R_{comp} = A*T^2 + B*T +C

Where:

R_{comp} is the compensation factor for Shunt resistance drift over ambience temperature normalized to 1 at 25℃.

T is temperature reading from PCB temperature sensor NTC.

A is quadratic coefficient, the default value is -0.000000576*.

B is first-order coefficient, the default value is +0.000086780*.

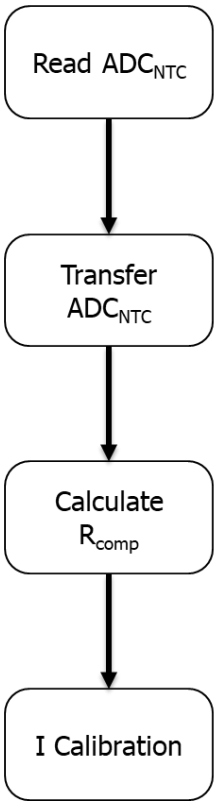
C: constant term coefficient, the default value is +0.998188760*.

The compensated shunt resistance value = R_{25} * R_{comp} .

R_{25} is resistance value of shunt at 25℃.

*Value is for reference only.

Compensated Flow:



ADC_{NTC} : ADC value of NTC

Transfer ADC_{NTC} to T
T : Temperature of NTC (℃)

$R_{comp} = R_{25℃} * (A * T^2 + B * T + C)$
R_{25} : Resistance value of shunt at 25℃
A, B, C : Compensation Factor

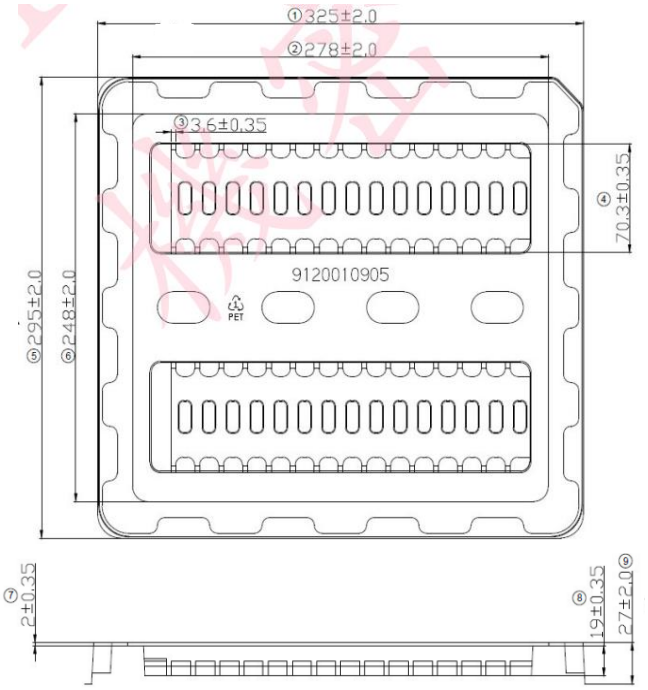
$I = V_{shunt} / R_{comp}$
V_{shunt} : Voltage drop of Shunt

RELIABILITY TEST:

Test Item	Test Condition	Spec
Low temperature storage	ISO 16750-4 IEC 60068-2-1 Ad Temperature: -40℃, Time: 240hrs, 500hrs	△R: ± 1%
High temperature storage	ISO 16750-4 IEC 60068-2-2 Temperature: 125℃,Time: 1000hrs, 2000hrs	△R: ± 1%
Temperature cycling storage	IEC 60068-2-14,Nb -40℃to 125℃, Dwell time ≥ 15 min, 1000 cycles	△R: ± 1%
Thermal shock storage	IEC 60068-2-14,Na -40℃ to 125℃, Dwell times ≥ 15 min Transfer time: ≤30s, 500, 1000 cycles	△R: ± 1%
Cycling moisture resistance storage	MIL-STD-883. METHOD 1004.7 -10℃ to 70℃ ; 90% ~ 100%RH @ 70℃, 20 cycles	△R: ± 1%
Damp heat storage	JESD22-A 101 Temperature: 85 ℃ ;Humidity:85%;Time :1000hrs	△R: ± 1%
Vibration	ISO 16750-3 IEC 60068-2, 64 Random 10~1000Hz, profile: 8hrs/axis The r.m.s. acceleration value shall be 27,1 m/s2.	△R: ± 0.5%
Mechanical Shock	ISO 16750-3 6 axis, 50G, 6ms, half-sine, 10 times/axis	△R: ± 0.5%
Free Fall	ISO 16750-3 3 axis, 2 falls per DUT by axis, 1m, concrete ground or steel plate	△R: ± 0.5%

Packing:

Tray packaging dimensions :



Label Marking :

The following items shall be marked on tray

(1) Description

(2) Quantity

(3) Part No.

(4) Tapping No.

Quantity: 30 Pcs / Tray

90 Pcs / Box